

CLAIMS

- 1 1. A biological material comprising:
- 2 a) at least one cell type selected from the group consisting of endothelial cells,
- 3 glandular cells, skin adnexa, germinative cells of hair bulbs and optionally
- 4 keratinocytes; and
- 5 b) a biocompatible and biodegradable three-dimensional matrix comprising at
- 6 least one hyaluronic acid derivative and optionally collagen and/or fibrin.
- 1 2. A biological material comprising:
- 2 a) at least one cell type selected from the group consisting of endothelial cells,
- 3 glandular cells, skin adnexa, germinative cells of hair bulbs, and optionally
- 4 keratinocytes, cultivated in presence of a medium treated with fibroblasts or
- 5 in a co-culture with fibroblasts; and
- 6 b) a biocompatible and biodegradable three-dimensional matrix comprising at
- 7 least one hyaluronic acid derivative and optionally collagen and/or fibrin.
- 1 3. A biological material according to claim 1 or 2, wherein the endothelial cells are
- 2 taken from the umbilical vein or from dermis or other tissue wherein blood
- 3 vessels are present.
- 1 4. A biological material according to claim 1 or 2, wherein the glandular cells are
- 2 liver cells or Langerhans islet cells.
- 1 5. A biological material according to claim 1 or 2, wherein the skin adnexa are
- 2 sebaceous glands, sweat glands, hair bulbs and the germinative cells are taken
- 3 from autologous, homologous or heterologous hair bulbs.
- 1 6. A biological material according to claims 1-5, wherein the hyaluronic acid
- 2 derivative is an ester of hyaluronic acid wherein part or all the carboxy functions
- 3 are esterified with alcohols of the aliphatic, aromatic, arylaliphatic,
- 4 cycloaliphatic, heterocyclic series.
- 1 7. A biological material according to claims 1-5, wherein the hyaluronic acid
- 2 derivative is an autocrosslinked ester of hyaluronic acid wherein a part or all of
- 3 the carboxy groups are esterified with the alcoholic functions of the same
- 4 polysaccharide chain or other chains.
- 1 8. A biological material according to claims 1-5, wherein the hyaluronic acid
- 2 derivative is a crosslinked ester of hyaluronic acid wherein a part or all of the

3 carboxy groups are esterified with polyalcohols of the aliphatic, aromatic,
4 arylaliphatic, cycloaliphatic, heterocyclic series, generating crosslinking by
5 means of spacer chains.

1 9. A biological material according to claims 1-5, wherein the hyaluronic acid
2 derivative is a hemiester of succinic acid or a heavy metal salt of the hemiester
3 of succinic acid with hyaluronic acid or with partial or total hyaluronic acid
4 esters.

1 10. A biological material according to claims 1-5, wherein the hyaluronic acid
2 derivative is a sulphated or N-sulphated hyaluronic acid or derivatives thereof.

1 11. A biological material according to claims 1-5, wherein the hyaluronic acid
2 ester is a benzyl ester with a degree of esterification of between 25% and
3 100%.

1 12. A biological material according to claims 1-11, wherein component b) is used
2 in the form of a nonwoven fabric, sponges, granules, microspheres,
3 membranes, films, guide channels, gauzes and combinations of the same with
4 one another.

1 13. A biological material according to claim 12, wherein component b) is used in
2 the form of a nonwoven fabric.

1 14. A process for the preparation of a biological material according to claims 1-13,
2 comprising the following steps:

- 3 i) isolating cells selected from the group consisting of endothelial cells,
4 glandular cells, skin adnexa, germinative cells of hair bulbs and optionally
5 keratinocytes;
6 ii) preparing a biocompatible and biodegradable three-dimensional matrix
7 comprising at least one hyaluronic acid derivative and optionally collagen
8 and/or fibrin;
9 iii) seeding at least one type of said cells on said matrix optionally in presence
10 of a medium treated with fibroblasts or in a co-culture with fibroblasts.

1 15. A process for the preparation of a biological material according to claims 1-13,
2 comprising the following steps:

- 3 i) isolating endothelial cells from human umbilical vein by enzymatic digestion
4 with collagenase;

- 5 ii) amplification on collagen-treated dishes;
- 6 iii) preparing a biocompatible and biodegradable three-dimensional matrix
- 7 comprising at least one hyaluronic acid derivative and optionally collagen
- 8 and/or fibrin;
- 9 iv) seeding said endothelial cells, optionally in association with the cells defined
- 10 in claim 1 or 2, on said matrix optionally in presence of a medium treated with
- 11 human fibroblasts in primary culture or in a co-culture with human fibroblasts.
- 1 16. Biological material according to claims 1-13, for use in human and veterinary
- 2 surgery.
- 1 17. A biological material according to claims 1-13 wherein component a)
- 2 comprises endothelial cells alone or in association with skin adnexa,
- 3 germinative cells or keratinocytes, in skin transplants.
- 1 18. Biological material according to claims 1-13, for use in skin and scalp
- 2 transplants.
- 1 19. Biological material according to claims 1-13, for use in skin transplants
- 2 wherein component a) comprising endothelial cells facilitates the mechanism of
- 3 neo-vascularization of the transplanted skin.
- 1 20. Biological material according to claims 1-13, wherein component a) comprises
- 2 germinative cells of hair bulbs, for use in scalp transplants.
- 1 21. Biological material according to claims 1-13, wherein component a) comprises
- 2 liver cells, for use in liver tissue transplants.
- 1 22. Biological material according to claims 1-13, wherein component a) comprises
- 2 islets of Langerhans, for use in cases of insufficient insulin production.
- 1 23. Biological material according to claims 1-13, wherein component a) comprises
- 2 endothelial cells, for use in surgery.
- 1 24. Biological material according to claim 23, for use in cardiovascular, aesthetic
- 2 and oncological surgery.
- 1 25. Biological material according to claims 23-24, for use in surgery to enhance
- 2 the biological process of tissue vascularization.

- 1 26. Biological material according to claims 1-13, for the screening of medicaments
2 or toxic substances.
- 1 27. Biological material according to claims 1-13, as a support for gene
2 transfection.
- 1 28. Biological material according to claim 27, for use in gene transfection.

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